

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2004-304242

(43)Date of publication of application : 28.10.2004

(51)Int.Cl.

H04N 7/18

(21)Application number : 2003-091348

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(22)Date of filing : 28.03.2003

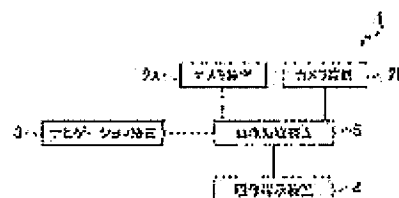
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## (54) APPARATUS OF PICKING UP OUTSIDE-OF-VEHICLE VIDEO IMAGE

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide an apparatus of picking up an outside-of-vehicle video image which is capable of displaying an image required for a driver by controlling a video image to be outputted to a display section while considering the positional relation between a vehicle and a road.

SOLUTION: A navigation device 3 acquires information about the direction and position of the vehicle 6 and roads around the vehicle 6, and inputs the acquired information into an image processing device 5. The image processing device controls a video image to be displayed on an image providing device 4, according to the information inputted from the navigation device 3.



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## CLAIMS

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[Claim(s)]

[Claim 1]

An imaging device which photos an image of right and left sides of vehicles,  
Direction of said vehicles, a position, and an information acquisition system that acquires information about a road around vehicles,  
An image processing portion which performs predetermined image processing to an image which said imaging device photoed according to information which said information acquisition system acquired,  
A picture presentation part which carries out the display output of the image to which said image processing was performed,  
An image imaging device outside a vehicle characterized by preparation \*\*\*\*\*.

[Claim 2]

The image imaging device outside a vehicle according to claim 1, wherein said image processing portion changes seemingly an image which carries out a display output by starting a part of picture which said imaging device photoed, and changing a portion to start.

[Claim 3]

The image imaging device outside a vehicle according to claim 2, wherein said image processing portion changes a portion to start gradually according to direction of vehicles and direction of a road.

[Claim 4]

An imaging device which photos an image of a longitudinal direction of vehicles,  
A picture presentation part which carries out the display output of the image which said imaging device photoed  
Direction of said vehicles, a position, and an information acquisition system that acquires information about a road around vehicles,  
An imaging direction control device to which bearing of the exposure axis of said imaging device is changed according to information which said information acquisition system acquired  
An image imaging device outside a vehicle characterized by preparation \*\*\*\*\*.

[Claim 5]

The image imaging device outside a vehicle according to claim 4, wherein said imaging direction control device changes gradually bearing of the exposure axis of said imaging device according to direction of vehicles and direction of a road.

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention relates to the image imaging device outside a vehicle which displays the dead angle of the driver of right and left sides.

[0002]

[Description of the Prior Art]

When a prospect displays the image of the right and left sides of vehicles on a monitor from before using the imaging device installed in the vehicles side when vehicles advancing into the crossing which is not good, the field-of-view auxiliary art which displays the dead angle of the driver of right and left sides is known (see the patent documents 1).

[0003]

[Patent documents 1]

JP,2002-354466,A

[0004]

[Problem(s) to be Solved by the Invention]

However, in the field-of-view auxiliary art to the former. Since the photographing area of the imaging device was optimized on the basis of the crossing at which it crosses right-angled, when vehicles advanced into the crossing at which roads cross aslant, or when vehicles came out from the institution facing a road to a road aslant, an image required for a driver might not be displayed. since the image of vehicles right and left was collectively displayed in the field-of-view auxiliary art to the former on one monitor installed near the vehicles medial axis, it was difficult to understand intuitively the situation outside the image empty vehicle with which the driver was displayed.

[0005]

[Means for Solving the Problem]

In order to solve above-mentioned SUBJECT, an image imaging device outside a vehicle concerning this invention, An imaging device which photos an image of right and left sides of

vehicles, direction of vehicles and a position, and an information acquisition system which acquires information about a road around vehicles, It is in having an image processing portion which performs predetermined image processing to an image which an imaging device photoed, and a picture presentation part which carries out the display output of the image to which predetermined image processing was performed according to information which an information acquisition system acquired.

[0006]

An imaging device with which an image imaging device outside a vehicle concerning this invention photos an image of a longitudinal direction of vehicles, It is in having a picture presentation part which carries out the display output of the image which an imaging device photoed, direction of vehicles, a position and an information acquisition system that acquires information about a road around vehicles, and an imaging direction control device to which bearing of the exposure axis of an imaging device is changed according to information which an information acquisition system acquired.

[0007]

[Effect of the Invention]

Since the image outputted to an indicator in consideration of the physical relationship of vehicles and a road is controlled according to the image imaging device outside a vehicle concerning this invention, an image required for a driver can be displayed.

[0008]

[Embodiment of the Invention]

Hereafter, with reference to drawings, the composition and operation of the image imaging device outside a vehicle used as 1st and 2nd embodiments of this invention are explained in detail.

[0009]

[A 1st embodiment]

[Composition of the image imaging device outside a vehicle]

With reference to introduction, drawing 1, and 2, the composition of the image imaging device outside a vehicle used as a 1st embodiment of this invention is explained.

[0010]

As shown in drawing 1, as main components, the image imaging device 1 outside a vehicle used as a 1st embodiment of this invention is provided with the camera device 2a, 2b, the navigation device 3, the image presentation device 4, and the image processing device 5, and is carried in vehicles.

[0011]

the above-mentioned camera device 2a and 2b are shown in drawing 2 -- as -- each of the front end of the vehicles 6 -- it is sideways attached to left-hand side and a right portion, and the image of the field A and the field B can be photoed, respectively. And the camera device 2a and 2b output the image of the photoed field to the image processing device 5. As a fixing place of the camera device 2a and 2b, the left-and-right-laterals portion of a front bumper is suitable, for example.

[0012]

The above-mentioned navigation device 3 is constituted by the common car navigation device. And the navigation device 3 acquires direction of the vehicles 6, a position, and the information about the road around the vehicles 6, and outputs the acquired information to the image processing device 5.

[0013]

As it is constituted by the two-dimensional monitoring device and shown in drawing 2, the described image presentation system 4 is the composition which spreads in a longitudinal direction focusing on the line segment 8 which passes along the driver's 7 center, and is installed ahead of the driver 7. and -- this -- an image presentation device -- four -- drawing 3 -- being shown -- as -- mentioning later -- processing -- an image processing device -- five -- from -- outputting -- having -- vehicles -- six -- right and left -- a field -- an image -- drawing 3 -- being shown -- as -- a line segment -- eight -- a center -- having carried out -- right and left -- display area -- A -- ' -- B -- ' -- dividing -- displaying . Thereby, the driver can understand the situation outside the displayed image empty vehicle intuitively.

[0014]

If arrangement relationship on either side is maintained, even if display area A' and B' are symmetrical to the line segment 8, they do not need to be good in that there is nothing, and it is not necessary to limit the physical relationship in particular with the line segment 8 further. Two two-dimensional monitoring devices which could constitute with one two-dimensional monitoring device, and were installed in right and left to the line segment 8 may constitute the image presentation device 4.

[0015]

The described image processing unit 5 generates the image of the field which the camera device 2a and 2b photoed, and the image which took into consideration the physical relationship of the vehicles 6 and a road by performing processing which the navigation device 3 acquires and is later mentioned using information, and outputs the generated image to the image presentation device 4.

[0016]

[Operation of the image imaging device outside a vehicle]

Next, with reference to the flow chart shown in drawing 4, operation of the image imaging device 1 outside a vehicle used as a 1st embodiment of this invention is explained.

[0017]

The flow chart shown in drawing 4 is started because the driver 7 directs the start of the image image pick-up processing outside a vehicle, and image pick-up processing progresses to processing of Step S1.

[0018]

In processing of Step S1, the navigation device 3 acquires the information about direction of the vehicles 6 and direction of the road a position and around the vehicles 6, and outputs the acquired information to the image processing device 5. Thereby, processing of this step S1 is completed

and image pick-up processing progresses to processing of Step S2 from processing of Step S1.

[0019]

In processing of Step S2, the image processing device 5 determines the camera device 2a and the imaging ranges a and b of 2b according to the information which the navigation device 3 acquired (imaging range decision processing). Here, the imaging ranges a and b are the sizes within the camera 2a and the photography feasible regions A and B of 2b. The details of this imaging range decision processing are later mentioned with reference to drawing 5. Thereby, processing of this step S2 is completed and image pick-up processing progresses to processing of Step S3 from processing of Step S2.

[0020]

In processing of Step S3, the image processing device 5 starts the image data corresponding to the imaging ranges a and b out of the image data which the camera device 2a and 2b photoed (picture logging processing). The details of this picture logging processing are later mentioned with reference to drawing 6 and drawing 7. Thereby, processing of this step S3 is completed and image pick-up processing progresses to processing of step S4 from processing of Step S3.

[0021]

In processing of step S4, the image processing device 5 carries out the output control of the data of the image of the started right-and-left field to display area A' of the image presentation device 4, and B'. Thereby, processing of this step S4 is completed and a series of image pick-up processings are ended.

[0022]

[Imaging range decision processing]

Next, as shown in drawing 5, the details of imaging range decision processing are explained by making processing at the time of the vehicles 6 turning left from the road 10, and coming out to the road 11 into an example.

[0023]

In the case of the example shown in drawing 5, the image processing device 5 determines the camera device 2a and the photographing areas a and b of 2b so that other vehicles which run the road 11 can be photoed. The image processing device 5 is good to compute the camera device 2a and the photographing areas a and b of 2b with reference to the angle which the vehicles 6 and the road 10 accomplish, or the angle which the road 10 and the road 11 accomplish. The image processing device 5 may acquire the information about the width of the road 11 from the navigation device 3, for example, when a photographing area wider when the width of road is wide, and the width of road are narrow, it may carry out it like a narrower photographing area, and it may determine the photographing areas a and b according to the width of road.

[0024]

When the vehicles 6 join on the road only for vehicles in the road 11 and the image on the left-hand side of vehicles is unnecessary, only the image on the right-hand side of vehicles may be photoed. Although the imaging ranges a and b may be computed each time from the angle which the vehicles 6 and the road 11 accomplish, it may determine whether compute mostly the angle

which the vehicles 6 and a road accomplish according to a classification part opium poppy and its classification to about five steps of a right angle and a shallow angle (right-hand side, left-hand side), and a deep angle (right-hand side, left-hand side).

[0025]

[Picture logging processing]

Next, the details of described image logging processing are explained with reference to drawing 6 and drawing 7.

[0026]

If only camera 2b on the right-hand side of vehicles is considered in order to make an understanding of picture logging processing easy now, camera device 2b would photo the field A always shown in drawing 6, and will have inputted into the image processing device 5 the data of the picture 12 shown in drawing 7.

[0027]

So, in this embodiment, the image processing device 5 starts and carries out display control of some pictures of the picture 12 by incorporating the data inputted from camera device 2b in a frame buffer, reconstructing the incorporated data in the frame buffer for an output, and outputting to the image presentation device 4. Thereby, the image processing device 5 can change seemingly the bearing of the exposure axis of camera device 2b, without making the bearing of the exposure axis of camera device 2b change physically.

[0028]

Since the picture corresponding to the field a1 shown in drawing 6 is displayed on display area B' when the image processing device 5 specifically cuts down the data corresponding to the picture 12a shown in drawing 7, the photographing area of camera device 2b serves as the field a1 seemingly. Since the picture corresponding to the field a2 shown in drawing 6 is displayed on display area B' when the image processing device 5 cuts down similarly the data corresponding to the picture 12b shown in drawing 7, the photographing area of camera device 2b serves as the field a2 seemingly. Since the picture corresponding to the field a3 shown in drawing 6 will be displayed on display area B' when the image processing device 5 cuts down the data corresponding to the picture 12c shown in drawing 7, the photographing area of camera device 2b serves as the field a3 seemingly.

[0029]

A photographing area may be divided into how many fields although the photographing area of camera device 2b was seemingly divided into three fields, the field a1, a2, and a3, in the example shown in drawing 6 and drawing 7 by making the logging field of a picture into the fields 12a, 12b, and 12c. The size (= the photographing area on the appearance of camera device 2b) of the picture to start may be changed for every picture. The image data of desired bearing of the exposure axis is acquirable by performing same logging processing also with the image data which the left-hand side camera device 2a photoed.

[0030]

Since the image processing device 5 controls the image displayed on the image presentation



device 4 clearly from the above explanation according to the information which the navigation device 3 acquired according to the image imaging device 1 outside a vehicle used as a 1st embodiment of this invention, An image required for a driver can be displayed (effect of claim 1).  
[0031]

By changing the picture which the image processing device 5 starts from the image data which the camera device 2a and 2b photoed according to the image imaging device outside a vehicle used as a 1st embodiment of this invention, Since the bearing of the exposure axis of the camera 2a and 2b is changed seemingly, the bearing of the exposure axis of the camera 2a and 2b can be changed by an easy mechanism (effect of claim 2).  
[0032]

Since the picture which the image processing device 5 starts according to the angle which the vehicles 6 and a road accomplish is changed gradually according to the image imaging device outside a vehicle used as a 1st embodiment of this invention, an image required for a driver can be displayed (effect of claim 3).  
[0033]

[0033]

[A 2nd embodiment]

[Composition of the image imaging device outside a vehicle]

Next, with reference to drawing 8 and drawing 9, the composition of the image imaging device outside a vehicle used as a 2nd embodiment of this invention is explained.

[0034]

As shown in drawing 8, as main components, the image imaging device 21 outside a vehicle used as a 2nd embodiment of this invention is provided with the camera devices 22a and 22b, the navigation device 23, the image presentation device 24, and the imaging direction control device 25, and is carried in vehicles.

[0035]

The above-mentioned camera devices 22a and 22b output the image of the front end of the vehicles 6 which it was sideways attached at left-hand side and a right portion, respectively, and was photoed to the image presentation device 24, as shown in drawing 9. As a fixing place of the camera devices 22a and 22b, the left-and-right-laterals portion of a front bumper is suitable, for example.

[0036]

The above-mentioned navigation device 23 is constituted by the common car navigation device. And the navigation device 23 acquires direction of the vehicles 6, a position, and the information about the road around the vehicles 6, and outputs the acquired information to the imaging direction control device 25.

[0037]

The described image presentation system 24 carries out the direct output of the image which the camera devices 22a and 22b photoed. Since the composition of others of the image presentation device 24 is the same as the image presentation device 4 of a 1st embodiment, the explanation is omitted here.

[0038]

The above-mentioned imaging direction control device 25 changes the bearing of the exposure axis of the cameras 22a and 22b by outputting a control signal to the camera devices 22a and 22b according to the information which the navigation device 23 acquired. As a method of changing bearing of the exposure axis, how to operate the camera device itself with an actuator, the method of moving with an actuator the mirror installed in front of the camera device, etc. can be considered.

[0039]

[Operation of the image imaging device outside a vehicle]

Next, with reference to the flow chart shown in drawing 10, operation of the image imaging device 21 outside a vehicle used as a 2nd embodiment of this invention is explained.

[0040]

The flow chart shown in drawing 10 is started because the driver 7 directs the start of the image pick-up processing outside a vehicle, and image pick-up processing progresses to processing of Step S11.

[0041]

In processing of Step S11, the navigation device 23 acquires the information about direction of the vehicles 6 and direction of the road a position and around the vehicles 6, and outputs the acquired information to the imaging direction control device 25. Thereby, processing of this step S11 is completed and image pick-up processing progresses to processing of Step S12 from processing of Step S11.

[0042]

In processing of Step S12, the imaging direction control device 25 determines the bearing of the exposure axis of the camera devices 22a and 22b according to the information which the navigation device 23 acquired. Thereby, processing of this step S12 is completed and image pick-up processing progresses to processing of Step S13 from processing of Step S12.

[0043]

As shown in drawing 11 here, when the vehicles 6 turn left from the road 10 and specifically come out to the road 11, the imaging direction control device 25, In processing of the above-mentioned step S12, the bearing of the exposure axis 26a and 26b of the camera devices 22a and 22b is determined so that other vehicles 6 which run the road 11 can be photoed with reference to direction of the vehicles 6, a position, and direction of the roads 10 and 12.

[0044]

The imaging direction control device 25 is good to determine the bearing of the exposure axis of the camera devices 22a and 22b with reference to the angle which the vehicles 6 and the road 10 accomplish, or the angle which the road 10 and the road 11 accomplish. When the vehicles 6 join on the road only for vehicles in the road 11 and the picture on the left-hand side of vehicles is unnecessary, only the picture on the right-hand side of vehicles may be photoed. Although bearing of the exposure axis may be computed each time from the angle which the vehicles 6 and the road 11 accomplish, it may determine whether compute mostly the angle which the vehicles 6 and a

road accomplish according to a classification part opium poppy and its classification to five steps of a right angle and a shallow angle (right-hand side, left-hand side), and a deep angle (right-hand side, left-hand side).

[0045]

The imaging direction control device 25 controls the bearing of the exposure axis of the camera devices 22a and 22b by processing of Step S13 to the bearing of the exposure axis determined by processing of Step S12. Thereby, processing of this step S13 is completed and image pick-up processing progresses to processing of Step S14 from processing of Step S13.

[0046]

In processing of Step S14, the image processing device 5 carries out the output control of the image which the camera devices 22a and 22b photoed to display area A' and B', respectively. Thereby, processing of this step S14 is completed and a series of image pick-up processings are ended.

[0047]

According to the image imaging device 21 outside a vehicle used as a 2nd embodiment of this invention, so that clearly from the above explanation. Since the imaging direction control device 25 controls the bearing of the exposure axis of the camera devices 22a and 22b according to the information which the navigation device 23 acquired, an image required for a driver can be displayed (effect of claim 4).

[0048]

Since the imaging direction control device 25 changes gradually the bearing of the exposure axis of the camera devices 22a and 22b according to the angle which the vehicles 6 and a road accomplish according to the image imaging device 21 outside a vehicle used as a 2nd embodiment of this invention, an image required for a driver can be displayed (effect of claim 5).

[Brief Description of the Drawings]

[Drawing 1] It is a block diagram showing the composition of the image imaging device outside a vehicle used as a 1st embodiment of this invention.

[Drawing 2] It is a figure for explaining the position of the camera device and image presentation device which are shown in drawing 1.

[Drawing 3] It is a figure for explaining the position of the display area of an image presentation device.

[Drawing 4] Although shown in drawing 1, it is a flow chart figure showing the flow of operation of the image imaging device outside a vehicle.

[Drawing 5] It is a figure for explaining the imaging range decision processing shown in drawing 4.

[Drawing 6] It is a figure for explaining the picture logging processing shown in drawing 4.

[Drawing 7] It is a figure for explaining the picture logging processing shown in drawing 4.

[Drawing 8] It is a block diagram showing the composition of the image imaging device outside a vehicle used as a 2nd embodiment of this invention.

[Drawing 9] It is a figure for explaining the position of the camera device shown in drawing 8.

[Drawing 10] Although shown in drawing 8, it is a flow chart figure showing the flow of operation of

the image imaging device outside a vehicle.

[Drawing 11] It is a figure for explaining the bearing-of-the-exposure-axis decision processing shown in drawing 10.

[Description of Notations]

1 and 21 Image imaging device outside a vehicle

2a, 2b, 22a, 22b camera device

3, 23 navigation devices

4 and 24 Image presentation device

5 Image processing device

25 Imaging direction control device

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[Translation done.]